

## **Chronic Obstructive Pulmonary Disease**

Chronic obstructive pulmonary disease (COPD), sometimes referred to as chronic lung disease, is a disease that damages lung tissue or restricts airflow through the large and small airways leading to the air sacs in the lungs. Chronic bronchitis and emphysema are the most frequently occurring COPDs. Smoking is the most common risk factor for developing COPD (CDC, 2011; NIH, 2010). Other risk factors in the development and progression of COPD include asthma, exposure to air pollutants in the ambient air and workplace environment, genetic factors, and respiratory infections (CDC, 2011).

Environmental tobacco smoke (ETS) may also increase the risk of developing COPD. The effect of chronic ETS exposure alone on pulmonary function in otherwise healthy adults is likely to be small. However, in combination with other exposures (e.g., prior smoking history, exposure to occupational irritants or ambient air pollutants), ETS exposure could contribute to chronic respiratory impairment (State of California, 2005).

This indicator presents U.S. adult (age 18 and older) prevalence rates for chronic bronchitis and emphysema and death rates for COPD as a whole and for chronic bronchitis and emphysema. Age-adjusted COPD prevalence data were compiled from 2002 to 2012 from the National Health Interview Survey (NHIS), conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics (NCHS). The NHIS is the principal source of information on the health of the civilian non-institutionalized population of the U.S. and since 1960 has been one of the major data collection programs of NCHS. COPD prevalence is based on the number of adults who reported that they had ever been told by a doctor or other health practitioner that they had emphysema or if a health practitioner told them they had chronic bronchitis in the last 12 months. Mortality data (all ages) were compiled between 1979 and 2011 using the National Vital Statistics System (NVSS), maintained by NCHS. The NVSS registers virtually all deaths and births nationwide, with data coverage from 1933 to 2011 and from all 50 states and the District of Columbia. Data were queried and compared separately for years 1979-1998 and those 1999 onward because the NVSS uses different codes to specify causes of death for these two time periods: the International Classification of Diseases 9<sup>th</sup> Revision (ICD-9) codes for 1979-1998 and the International Classification of Diseases 10<sup>th</sup> Revision (ICD-10 codes) beginning in 1999.

### **What the Data Show**

#### *COPD Prevalence*

Exhibits 1 and 2 present the age-adjusted prevalence of chronic bronchitis and emphysema from 2002 to 2012, respectively. The reported total prevalence of chronic bronchitis in U.S. adults over the age of 18 years was highest in 2002 (44 cases per 1,000), followed by relatively steady rates from 2003 to 2012, except for decreases in 2007 (34 cases per 1,000) and in 2012 (36 cases per 1,000), the most current reporting year. The reported prevalence of emphysema in U.S. adults during the same time period was relatively stable, with rates ranging from 15 (2002 and 2003) to 21 (2009) cases per 1,000. In 2012, the most recent reporting year, the rate was 16 cases per 1,000.

Exhibits 1 and 2 also display age-adjusted chronic bronchitis and emphysema prevalence in U.S. adults, respectively, by race, ethnicity, and sex; age-specific prevalence is also presented. For the 11 years shown for chronic bronchitis, whites have the highest prevalence in four years and American

Indians/Alaska Natives have the highest prevalence in seven years. Asians have the lowest prevalence of chronic bronchitis in all 11 years reported (Exhibit 1). For eight of the 11 years reported, emphysema prevalence is higher among white adults. American Indians/Alaska Natives have the highest prevalence for three of the 11 years reported. Asians consistently have the lowest prevalence of emphysema except in 2006, when the prevalence for Asians is above blacks (Exhibit 2). Prevalence of both bronchitis and emphysema rises with age, with the highest rates seen among those 65 and older.

In addition, the Hispanic or Latino population had a consistently lower prevalence of chronic bronchitis (Exhibit 1) and emphysema (Exhibit 2) than the non-Hispanic or Latino population from 2002-2012, the period for which these data are available. For example, in 2012, prevalence in Hispanics or Latinos was lower than non-Hispanics or Latinos for chronic bronchitis (25 compared to 37 cases per 1,000, respectively) and emphysema (7 compared to 17 cases per 1,000, respectively). Prevalence also differs by sex. In 2012, females had more than 1.5 times the reported prevalence of chronic bronchitis compared to males (43 versus 28 cases per 1,000, respectively), a consistently observed difference between 2002 and 2012 (Exhibit 1). In contrast, the prevalence rates for emphysema from 2002-2010 have been consistently higher in males than in females, with the difference varying by as much as 12 cases per 1,000 (2006) and as little as 1 case per 1,000 (2008). In 2011, however, prevalence for emphysema was the same in females and in males (19 cases per 1,000). In 2012, emphysema prevalence reverted back to the typical pattern during the 11-year reporting period of males having higher rates compared to females (Exhibit 2).

### *COPD Mortality*

In 2011, COPD is the third leading cause of mortality, accounting for 142,943 (5.7 percent) of all deaths (CDC, 2014). Exhibit 3 shows that the age-adjusted death rate for COPD as a whole has increased over time, with national rates ranging from 25.5 per 100,000 in 1979 to 41.8 per 100,000 in 1998. From 1999 to 2011, rates held steadier, ranging from a high of 45.4 per 100,000 in 1999 to a low of 41.0 per 100,000 in 2006.

Age-adjusted death rates for emphysema (range of 6.5-6.9 per 100,000 for 1979-1998, and 2.8-6.5 per 100,000 for 1999-2011) and chronic bronchitis (range of 0.9-1.7 per 100,000 for 1979-1998 and 0.1-0.2 per 100,000 for 1999-2011) appear to be slowly declining or steady. It is noteworthy that in 2011 approximately 77 percent of all COPD mortality is of an unspecified nature and not attributed to a specific COPD subgroup such as emphysema or chronic bronchitis (CDC, 2014). (Data not shown.)

Exhibit 3 presents the overall COPD death rates in the U.S. and the 10 EPA Regions for 1979-1998 and 1999-2011. The age-adjusted COPD death rates increased in each of the 10 Regions between 1979 and 1998. The rates ranged from 22.2 (Region 2) to 31.2 (Region 8) per 100,000 in 1979 and 33.5 (Region 2) to 47.9 (Region 8) per 100,000 in 1998. Between 1999 and 2011, COPD death rates in each of the 10 EPA Regions have shown an overall decline or remained steady, except for Region 7 that had a slight increase over this time period.

COPD age-adjusted death rates have been declining for males over time, with a rate of 58.7 per 100,000 in 1999 compared to 48.6 per 100,000 in 2011. For females, the rates are lower than males and have been relatively stable between 1999 and 2011 (37.7 and 38.5 per 100,000, respectively). In 2011, the COPD age-adjusted death rate was highest among whites (45.1 per 100,000), followed by blacks (29.2 per 100,000), American Indians or Alaska Natives (28.7 per 100,000), and lowest among Asian or Pacific Islanders (14.5 per 100,000). COPD death rates increase with age: the 2011 rates were 0.4 per 100,000 for those aged 0-14 years, 1.0 per 100,000 for those aged 15-44 years, 21.8 per 100,000 for those aged 45-64 years, and 294.0 per 100,000 for those aged 65 years and older (CDC, 2014). (Data not shown.)

## Limitations

- Prevalence data presented in the NHIS are based on self-reported responses to specific questions pertaining to COPD-related illnesses, and are subject to the biases associated with self-reported data. Self-reported data can underestimate the disease prevalence being measured if, for whatever reason, the respondent is not fully aware of his/her condition.
- COPD death rates are based on underlying cause of death as entered on a death certificate by a physician. Some individuals may have had competing causes of death. “When more than one cause or condition is entered by the physician, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD [International Classification of Diseases], and associated selection rules and modifications” (CDC, n.d.). Consequently, some misclassification of reported mortality might occur in individuals with competing causes of death, as well as the possible underreporting of COPD as the cause of death.
- The International Classification of Diseases 9<sup>th</sup> Revision (ICD-9) codes were used to specify underlying cause of death for years 1979-1998. Beginning in 1999, cause of death is specified with the International Classification of Diseases 10<sup>th</sup> Revision (ICD-10) codes. The two revisions differ substantially, and to prevent confusion about the significance of any specific disease code, data queries are separate.

## Data Sources

COPD prevalence data were obtained from annual reports published by NCHS (NCHS, 2004, 2005, 2006a,b, 2007, 2009a,b, 2010, 2012a,b, 2014), which summarize health statistics compiled from the NHIS ([http://www.cdc.gov/nchs/nhis/nhis\\_series.htm](http://www.cdc.gov/nchs/nhis/nhis_series.htm)). Mortality statistics were obtained from CDC’s “compressed mortality” database, accessed through CDC WONDER (CDC, 2014) (<http://wonder.cdc.gov/mortSQL.html>). EPA Regional mortality statistics were generated by combining and age-adjusting state-by-state totals for each EPA Region using data from CDC WONDER.

## References

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NCHS. 2006b. Summary health statistics for U.S. adults: National Health Interview Survey, 2004. Vital Health Stat. 10(228). [http://www.cdc.gov/nchs/data/series/sr\\_10/sr10\\_228.pdf](http://www.cdc.gov/nchs/data/series/sr_10/sr10_228.pdf) (PDF) (164 pp, 3.8MB).

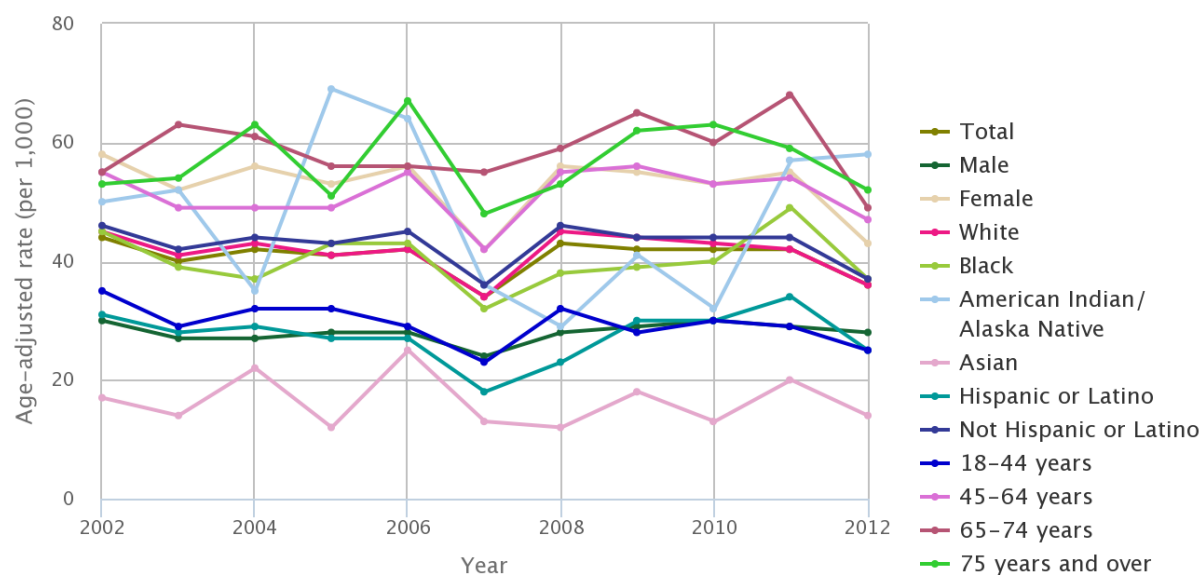
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**Exhibit 1. Age-adjusted chronic bronchitis prevalence in U.S. adults (age 18 and older) by sex, race, ethnicity, and age group, 2002–2012**



Rates are age-adjusted to the 2000 U.S. standard population.

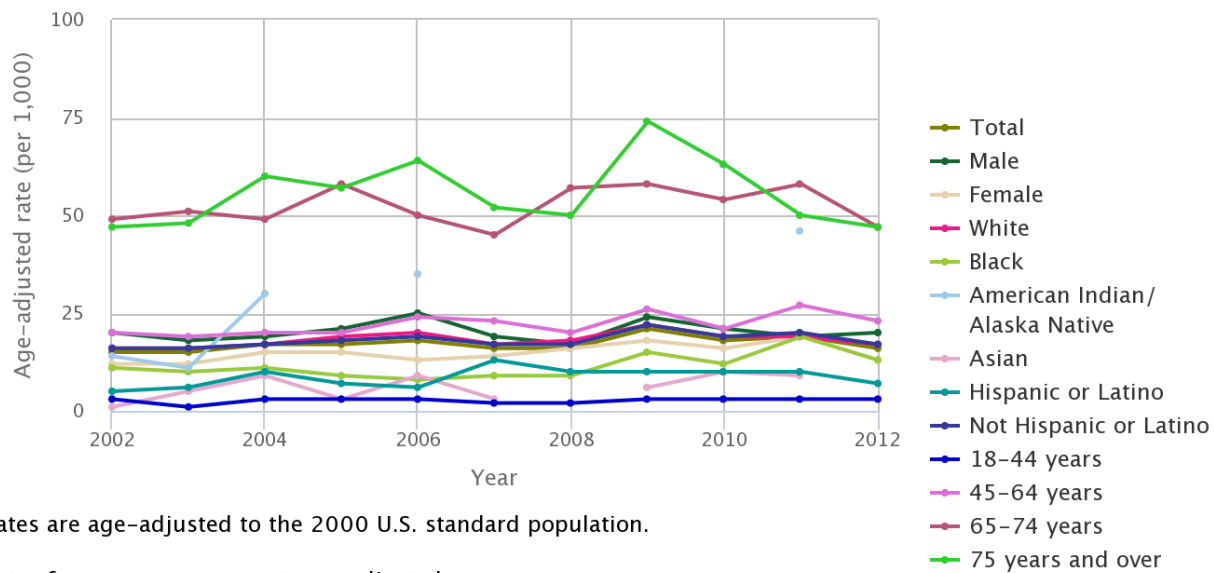
Rates for age groups are not age-adjusted.

Some values presented for American Indians/Alaska Natives and Asians have a relative standard error of greater than 30% and less than or equal to 50%, and should be used with caution.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** NCHS, 2004, 2005, 2006a,b, 2007, 2009a,b, 2010, 2012a,b, 2014

## Exhibit 2. Age-adjusted emphysema prevalence in U.S. adults (age 18 and older) by sex, race, ethnicity, and age group, 2002–2012



Rates are age-adjusted to the 2000 U.S. standard population.

Rates for age groups are not age-adjusted.

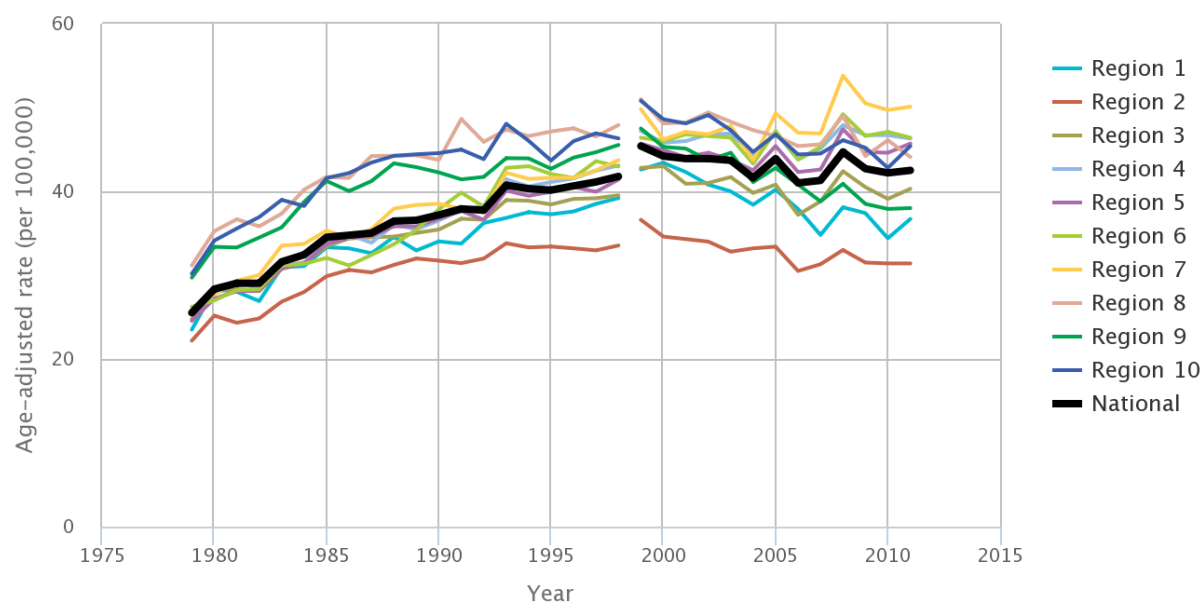
Some values presented for American Indians/Alaska Natives and Asians have a relative standard error of greater than 30% and less than or equal to 50%, and should be used with caution.

A few data points are not plotted because standards of reliability or precision were not met.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** NCHS, 2004, 2005, 2006a,b, 2007, 2009a,b, 2010, 2012a,b, 2014

### Exhibit 3. Age-adjusted chronic obstructive pulmonary disease death rates in the U.S. by EPA Region, 1979–2011



Due to differences in the ICD system used for classifying mortalities, data from 1979–1998 should not be directly compared with data from 1999–2011 [ICD-9 codes: 490–494, 496 (1979–1998); ICD-10 codes: J40–J47 (1999–2011)].

Rates are age-adjusted to the 2000 U.S. standard population.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** CDC, 2014